WHAT IS CLAIMED IS:

1. A method of effecting expression of a selected polynucleotide in a mammalian cell comprising:

(a) providing an expression construct, said expression construct comprising (i) an inducible promoter operably linked to a gene encoding a transactivating factor, and (ii) a second promoter operably linked to said selected polynucleotide, wherein said second promoter is activated by said transactivating factor;

(b) introducing said expression construct into said cell; and

(c) subjecting said cell to conditions which activate said inducible promoter,

wherein said conditions result in the expression of said selected polynucleotide.

2. The method of claim 1, wherein said inducible promoter is a heat shock promoter and the conditions which activate said inducible promoter are hyperthermic conditions.

3. The method of claim 2, wherein said hyperthermic conditions comprise a temperature between about basal temperature for said cell and about 42°C.

4. The method of claim 3, wherein said hyperthermic conditions comprises a temperature between about 37°C and about 42°C.

5. The method of claim 4, wherein said hyperthermic conditions comprise a temperature between about 38°C and about 41°C.

6. The method of claim 5, wherein said hyperthermic conditions comprise a temperature between about 39°C and about 40°C.

7. The method of claim 2, wherein said heat shock promoter is derived from a promoter selected from the group consisting of the HSP70, HSP90, HSP60, HSP27, HSP72, HSP73, HSP25, ubiquitin, and HSP28 promoters.

8. The method of claim 1, wherein said inducible promoter comprises a hypoxia-responsive element.

9. The method of claim 1, wherein said second promoter is selected from the group consisting of an HIV-1 promoter and an HIV-2 promoter, and said transactivating factor is tat.

10. The method of claim 1, wherein the expression of said selected polynucleotide results in the production of a polypeptide, a protein, a ribozyme, or an antisense nucleic acid.

11. The method of claim 1, wherein said selected polynucleotide encodes a protein selected from the group consisting of ornithine decarboxylase antizyme protein, p53, p16, neu, IL1, IL2, IL4, IL7, IL12, IL15, FLT-3 ligand, GM-CSF, G-CSF, IFNγ, IFNα, TNF, HSV-TK, I-CAM1, HLA-B7, and TIMP-3.

12. The method of claim 1, wherein said expression construct further comprises a gene encoding a selectable marker.

13. The method of claim 1, wherein said expression construct further comprises (i) a second selected polynucleotide operably linked to said second promoter; and (ii) an internal ribosome entry site positioned between said first and second selected polynucleotides.

14. The method of claim 1, wherein said cell is a tumor cell.

15. The method of claim 1, wherein the introduction of said expression construct into said cell is mediated by a delivery vehicle selected from the group consisting of liposomes, retroviruses, adenoviruses, adeno-associated viruses, lentiviruses, herpes simplex viruses, and vaccinia viruses.

16. The method of claim 1, wherein the introduction of said expression construct into said cell occurs *in vitro*.

17. The method of claim 1, wherein the introduction of said expression construct into said cell occurs *in vivo*.

18. A method of providing a subject with a therapeutically effective amount of an expression product of a selected polynucleotide comprising:

(a) providing a first expression construct, said expression construct comprising an inducible promoter operably linked to a gene encoding a transactivating factor;

(b) providing a second expression construct, said second expression construct comprising a second promoter operably linked to said selected polynucleotide, wherein said second promoter is activated by said transactivating factor;

(c) introducing said first and second expression constructs into a cell of said subject; and

(d) subjecting said cell to conditions which activate said inducible promoter, wherein expression of said selected polynucleotide is induced by said conditions.

19. The method of claim 18, wherein said inducible promoter is a heat shock promoter and the conditions which activate said inducible promoter comprise a temperature between about basal temperature and about 42°C.

20. The method of claim 19, wherein said first and second expression constructs are on the same vector.

21. The method of claim 20, wherein the introduction of said expression constructs into said cell occurs *ex vivo*.

22. The method of claim 18, wherein the introduction of said expression constructs into said cell occurs *in vivo*.

23. The method of claim 18, wherein the expression product of said selected polynucleotide is harmful to a pathogen in said subject, wherein said pathogen is selected from the group consisting of viruses, bacteria, fungi, and parasites.

24. The method of claim 18, wherein the expression product of said selected polynucleotide inhibits the growth of said cell.

25. The method of claim 18, wherein the expression product of said selected polynucleotide replaces a deficient protein in said subject.

26. The method of claim 18, wherein the expression product of said selected polynucleotide promotes nerve regeneration.

27. A method of treating cancer in a mammal comprising the steps of:

(a) providing an expression construct, said expression construct comprising (i) an inducible promoter operably linked to a gene encoding a transactivating factor; and (ii) a second promoter operably linked to a selected polynucleotide, wherein said second promoter is activated by said transactivating factor;

(b) introducing said expression construct into a tumor cell; and

(c) subjecting said tumor cell to conditions which activate said inducible promoter, wherein said conditions result in the expression of said selected polynucleotide and the expression product of the selected polynucleotide is expressed in an amount effective to inhibit the growth of said tumor cell.

28. The method of claim 27, wherein said inducible promoter is a heat shock promoter and the conditions which activate said inducible promoter are hyperthermic conditions comprising a temperature between about basal temperature and about 42°C.

29. The method of claim 27, further comprising treating said tumor cell with at least one established form of therapy for cancer which is selected from the group consisting of external beam radiation therapy, brachytherapy, chemotherapy, and surgery.

30. The method of claim 27, further comprising:

(d) treating said tumor cell with the radioprotector WR-33278 or WR-1065 after subjecting it to hyperthermic conditions; and

(e) in a final step, treating said tumor cell with radiation therapy,

wherein said selected polynucleotide encodes ornithine decarboxylase antizyme protein.

31. The method of claim 27, wherein said mammal is a human.

32. The method of claim 27, wherein said cancer is selected from the group consisting of cancers of the brain, lung, liver, bladder, spleen, kidney, lymph node, small intestine, pancreas, blood cells, colon, stomach, breast, endometrium, prostate, testicle, ovary, skin, vulva, cervix, head and neck, esophagus, bone marrow, and blood.

33. A method for provoking an immune response in a mammal comprising:

(a) providing an expression construct, said expression construct comprising (i) an inducible promoter operably linked to a gene encoding a transactivating factor; and (ii) a second promoter operably linked to a selected polynucleotide, wherein said second promoter is activated by said transactivating factor;

(b) introducing said expression construct into a cell in the mammal; and

(c) subjecting said cell to conditions which activate said inducible promoter,

wherein said conditions result in the expression of said selected polynucleotide and the expression product of the selected polynucleotide is expressed in an amount effective to provoke an immune response in said

mammal, said immune response being selected from the group consisting of a humoral immune response and a cellular immune response.

34. The method of claim 33, wherein the inducible promoter is a heat shock promoter and the conditions which activate said inducible promoter are hyperthermic conditions comprising a temperature between about basal temperature and about 42°C.

35. The method of claim 33, wherein the immune response is directed against said cell.

36. The method of claim 35, further comprising treating said cell with an established form of therapy for cancer selected from the group consisting of chemotherapy, external beam radiation therapy, brachytherapy, and surgery.

37. The method of claim 33, wherein said mammal is a human.

38. A method of altering the genetic material of a mammal, comprising:

(a) providing an expression construct, said expression construct comprising (i) an ~~inducible~~ heat shock promoter operably linked to a gene encoding a transactivating factor; and (ii) a second promoter operably linked to ~~said~~ a selected polynucleotide, wherein said second promoter is activated by said transactivating factor; and

(b) introducing said expression construct into a cell of said mammal.

39. An expression construct comprising:

(a) a gene encoding a transactivating factor;

(b) an inducible promoter operably linked to said gene;

(c) a selected polynucleotide; and

(d) a second promoter operably linked to said selected polynucleotide, said second promoter being activated by said transactivating factor.

40. The expression construct of claim 39, wherein said inducible promoter is a heat shock promoter and expression of said selected polynucleotide is induced by hyperthermic conditions, said hyperthermic conditions comprising a temperature between about 37°C and about 42°C.

41. The expression construct of claim 40, wherein said heat shock promoter is derived from a promoter selected from the group consisting of the HSP70, HSP90, HSP60, HSP27, HSP72, HSP73, HSP25, ubiquitin, and HSP28 promoters.

42. The expression construct of claim 39, wherein said inducible promoter comprises a hypoxia-responsive element.

43. The expression construct of claim 39, wherein said second promoter is selected from the group consisting of HIV-1 promoter and HIV-2 promoter and said transactivating factor is selected from the group consisting of tat.

44. The expression construct of claim 39, wherein expression of said selected polynucleotide results in the production of a polypeptide, protein, ribozyme or antisense molecule.

45. The expression construct of claim 39, wherein said expression construct further comprises (i) a second selected polynucleotide operably linked to said second promoter; and (ii) an internal ribosome entry site positioned between said first and second selected polynucleotides.

46. A cell comprising the expression construct of claim 39.